DELAWARE RIVERKEEPER NETWORK

March 27, 2017

Anderson Hartzell
Acting Regional Director
Pennsylvania Department of Environmental Protection
2 E. Main St.
Norristown, PA 19401

Re: Bishop Tube Site

Dear Acting Director Hartzell:

As you know, the Delaware Riverkeeper Network (DRN) has been conducting an extensive review of the files related to the Bishop Tube Site. We are very concerned that the deliberative review by the Department of Environmental Protection that was underway is now being shifted to a less rigorous review, and that previous concerns of the Department and its staff are now being set aside in order to quickly advance the project.

Attached you will find a second analysis by Dr. Tom Myers regarding the proposed development at the Bishop Tube Site. DRN will submit additional comments in the near future.

Given your request that I stay in direct touch with you over this issue and any concerns I might have, I submit this request directly to you, copying relevant staff.

With regards,

Maya K. van Rossum
the Delaware Riverkeeper

DELAWARE RIVERKEEPER NETWORK
925 Canal Street, Suite 3701
Bristol, PA 19007
Office: (215) 369-1188
fax: (215)369-1181
drn@delawareriverkeeper.org
www.delawareriverkeeper.org

Tom Myers, Ph.D.
Hydrologic Consultant
6320 Walnut Creek Road
Reno, NV 89523
775-530-1483
tommyers1872@gmail.com

Technical Memorandum

Review of Bishop Tube Superfund Site and an Assessment of the Site's Proposed Residential Development

March 23, 2017

Prepared for:

Delaware Riverkeeper Network
Bristol, PA

Introduction

The Bishop Tube site is a 13.7 acre former metals processing plant located in Malvern, PA just south of Lancaster Avenue. It initially had been used for the construction of tubing from stainless steel and more recently operated as a metal alloy tube manufacturing facility until it closed in 1999 (Roux Associates 2015, p 17). "During certain periods of time, chlorinated solvents were used at the site" (Id.).

The area has recently been rezoned for residential purposes, and the current owner, Constitution Drive Partners, L.P. (CDP), proposes to construct townhomes and apartments on the site (Environmental Standards 2017, p 1-1). CDP would excavate soils with high levels of trichloroethane (TCE) from three areas of concern (AOCs) and ship the soil offsite for disposal (Environmental Standards 2017). An AOC is an area where the concentration exceeds various standards.

The purpose of this technical memorandum is to identify issues of concern with respect to developing the site for residential use. Specifics of this technical memorandum include a review of the contaminants and hydrogeology at the site. I reviewed the 2015 Remedial Investigation Report (RIR) (Roux Associates 2015) as a primary source of information, supplemented with a 2009 groundwater investigation (Baker 2009) for an improved description of groundwater flow. In addition, I reviewed the Remedial Scope of Work Addendum dated November 18, 2016 including the attached Remediation Scope of Work dated August 23, 2016

(Environmental Standards 2016). The current remediation proposal is in Environmental Standards (2017, 2016).

Bishop Tube Site

The Bishop Tube Site is a former metals processing plant, as noted in the Introduction. The site is relatively steep, with ground surface contours dipping steeply to the north and to Little Valley Creek (LVC) on the east side of the site. The site lies within the Valley Creek Basin on the west bank of Little Valley Creek (LVC) (Figure 1). LVC flows northward along the east side of the plant site (Figure 1). LVC is an "exceptional value" stream under the PADEP Code, Title 25, Environmental Resources, Chapter 93.

There are substantial amounts of TCE in groundwater throughout the Bishop Tube site (Figure 2). Groundwater flowing beneath the site discharges to springs and to the LVC just east of the site, both increasing the flow and the load of TCE discharging from the site (Figure 2). These streams transport TCE downstream to Valley Creek and the Schuylkill River.

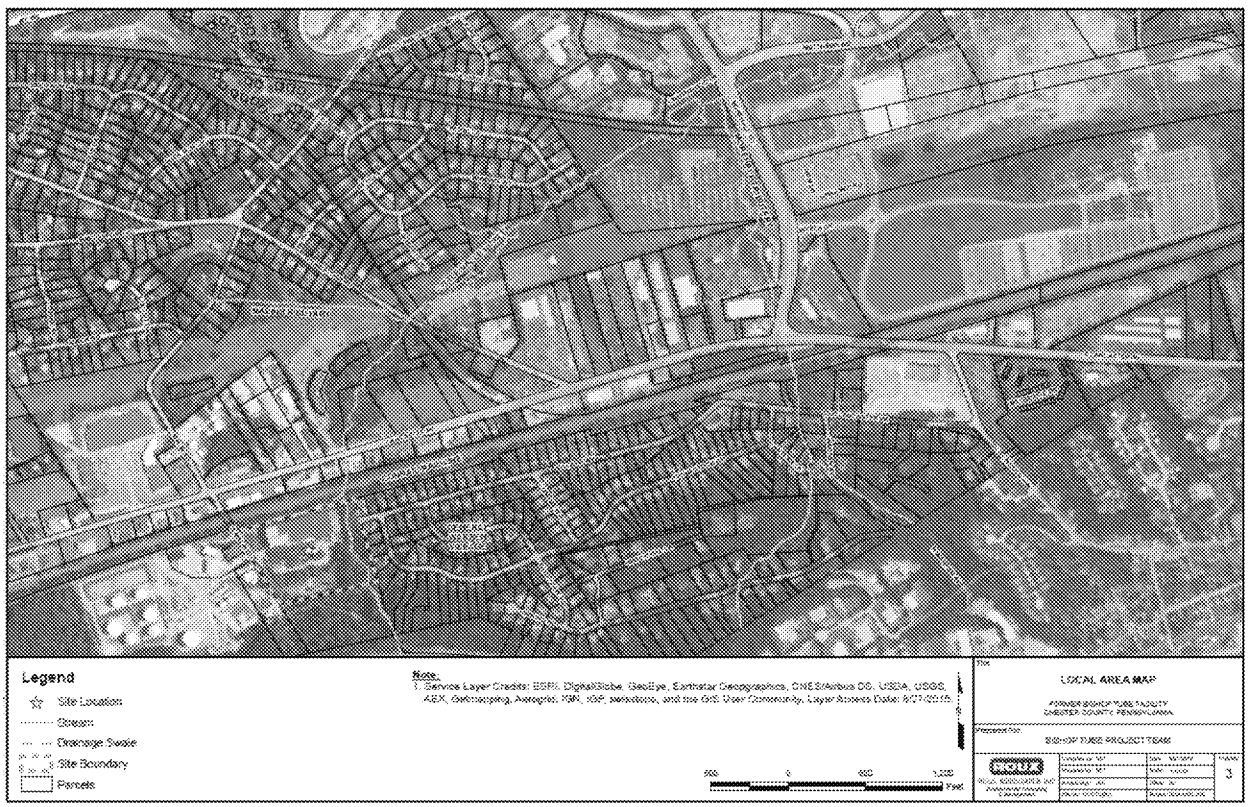

Figure 1: Local area map for the Bishop Tube site, showing the site and proximity to the Little Valley Creek.

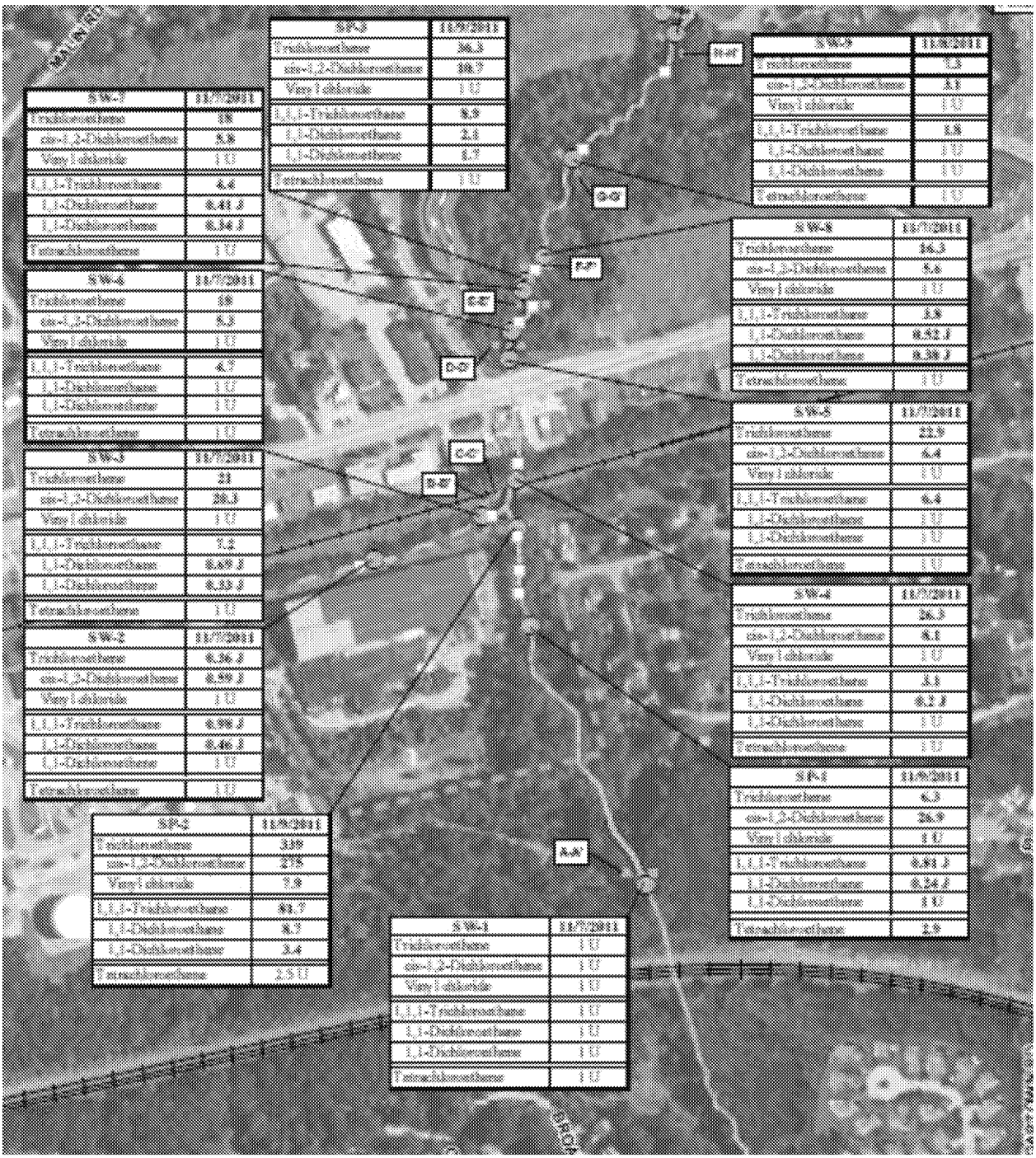

Figure 2: Snapshot of a portion of RIR Figure 6 showing TCE concentrations along Little Valley Creek.

Spills from the Bishop Tube Plant site are the source of TCE in the soils beneath the site. Soil samples reported by Roux Associates (2015) reflect areas with high TCE concentrations in the soil above the water table. Recharge seeps through overburden and leaches residual TCE from unsaturated soils to the water table, whether the water table is in the soils or bedrock. TCE

also sinks deep into the bedrock fractures, as evidenced by high TCE concentrations at substantial depth (up to 400 feet), as described in the next paragraph.

TCE concentrations at the plant site and downgradient to the northeast are very high (Roux Associates 2015, Figure 20). High concentrations occur at various depths in the bedrock, including 128,800 ug/l at 56-66 feet below ground surface (bgs) in MW-51B northeast of the site and 418,000 and 716,000 at 222-232 and 345-360 feet bgs, respectively, in MW-26C and MW-75A on the northeast corner of the site (RIR Figure 20A). TCE has transported substantially off the site to the northeast through the groundwater.

Concentrations are higher in bedrock with some being very high deeper in the bedrock (Baker 2009). Bedrock fractures divert groundwater flow to the east (Baker 2009). Groundwater flow and TCE transport follows the path of least resistance in a direction that is just north of east. Some residences in the subdivision have reported high TCE concentrations in indoor air (Baker 2009, p 4). TCE volatilizes, or evaporates, and the resulting gas accumulates in overlying airspace such as a basement. This could only occur if groundwater with TCE flowed under the subdivision.

Stream TCE concentrations increase where there are springs or where the stream gains flow over fracture zones. Overall concentrations are relatively steady state, especially over the past twenty years (RIR, Appendix D). No evidence supports a conclusion that groundwater at the site is undergoing substantial natural remediation.

Risks from TCE Contamination at the Bishop Tube Site

Until the site is properly remediated, including unsaturated soils and groundwater, the contamination at Bishop Tube will affect water quality throughout the Valley Creek watershed. TCE that remains in unsaturated soil or that has adsorbed into bedrock fractures dissolves into groundwater and therefore is a continuing source until remediated. The potential for contamination to migrate from the site through groundwater to LVC as described above is the most important offsite risk to the environment. The vast amounts of TCE and contaminants remaining stored in the soils at the site create a health risk due to the potential direct contact to the soil, airborne TCE in neighboring residences, and contact with surface water.

Risks from Developing the Bishop Tube Site

TCE sources will remain until removed or leached out. Removing the sources by excavating buildings and soils, as proposed by CDP, could cause short-term releases from disturbances. Allowing the materials to remain in place and slowly leach out would allow the site to be a long-term source.

Environmental Standards (2017, p 4-4) proposes excavating soils with more than 500 ug/kg of TCE from three AOCs, but not deeper than bedrock or the point of saturated conditions. Excavation could add contaminants to the groundwater and downstream waters in the following ways:

1. Simply excavating the soil will create more surface area for seepage to contact and leach contaminants. If removal occurs slowly or areas are disturbed but not removed, excavation could create a short-term increased source.
2. Future backfills change the amount of seepage reaching the bedrock. This could change the rate of transport through the bedrock. TCE held in shallow fractures will continue to be a source.
3. Heavy excavation equipment could become a temporary source. Mud sticking to trucks could have high amounts of TCE contained in it.
4. Dust leaving the site during excavation could contain high levels of TCE. Downwind sites could accumulate dust which would be a short-term source of TCE leaching into the groundwater.

The plan includes removing "source area soils to reduce ongoing leaching of CVOCs to groundwater and surface water" (Environmental Standards 2016, p 3-1). A CVOC is a chlorinated volatile organic compound and class of compounds that are predominately solvents that includes TCE. TCE and most CVOCs are dense nonaqueous phase liquids (DNAPLs) which essentially means they are denser than water so they sink and they have low solubility so that they exist as masses in the groundwater that will slowly dissolve and thereby be a contaminant source far into the future. Being denser than water, TCE at this site sinks into bedrock fractures below the saturated fill.

This plan will not remove CVOCs that have reached and sunk deeply in to the groundwater because they are denser than water and only slightly soluble. CDP will not extend excavation into saturated soil or below bedrock if unsaturated soil sits atop the bedrock. Therefore, CVOCs that have reached the bedrock through unsaturated soil or groundwater will remain after CDP's excavation and after the residential development has been constructed, and continue to be a contaminant source for an indeterminate period. Development on the surface of this site may make remediation of this groundwater much more difficult in the future.

The installation of a vapor barrier in structures constructed above contaminated groundwater (Environmental Standards 2016, p 3-1) implies that the contaminated groundwater will be allowed to remain in place. Groundwater flows and will discharge TCE to Little Valley Creek or locations further downstream into the future. The proposed remediation will not prevent ongoing offsite flow of TCE because it only includes unsaturated soil. The importance of this has recently been verified by a consultant for CDP completing indoor air sampling at a nearby house.

PADEP should require an analysis of the amount of CVOCs in the groundwater and precipitated from solution in the aquifer; the precipitate will be a source into the future until it has dissolved and transported downgradient. Without knowing the amount, it is not possible to estimate how long it would remain a source, but considering that TCE concentrations in groundwater have been steady for at least two decades, it is likely to be on the order of at least decades. PADEP should commit to measuring the amount remaining.

PADEP has backed down from previous comments made to CDP in a way that will decrease the remediation at the site. In a letter to CDP dated March 13, 2017 (Armstrong 2017), PADEP provided its most recent comments on the January 2017 Remediation Scope of Work (Environmental Standards 2017). The new scope of work (Id.) had not implemented various previous comments made by PADEP (Environmental Standards 2016). The following paragraphs explain how the March 13 comment letter (Armstrong 2017) essentially accepts the new scope with little substantive comment, including failing to ensure that all previous PADEP questions, concerns and recommendations have been appropriately addressed.

Section 4.2, Remedial Activities (Environmental Standards 2017) describes the excavation of three areas of concern (AOCs), the former vapor degreaser area of Building #5, former vapor degreaser area of Building #8, and the former drum storage area. The 2017 estimate was for the removal of 10,788 tons while in 2016 the estimate was for 16,511 tons, with the difference being due to measurements made in December 2016. Rather than ensure this significant discrepancy was fully explained and confirmed, PADEP only suggested the soil volume calculation may be incorrect (Armstrong 2017, p 2) even though they questioned the precision of the instrument used to make the measurements (Armstrong 2017, p 3).

PADEP also gave up on comments regarding the necessary excavation being "greater or smaller than contamination in unsaturated soils" (Environmental Standards 2016a, p 3). PADEP requested sampling outside of the three identified AOCs so that CDP could remove additional contaminated saturated soil (Id.). CDP claims that any contamination outside of the AOCs would be "associated with TCE migration due to groundwater flow" and that "CDP will not chase impact in saturated soil resulting from migration of TCE in groundwater" (Id.). PADEP dropped this concern in the letter even though staff have recognized that CDP's position was different than earlier statements. TCE remaining in unsaturated soils creates a source that with time will expand away from the AOCs both through unsaturated soil and groundwater. Because TCE becomes PADEPs responsibility once it moves from unsaturated soil to groundwater, delaying remediation shifts responsibility to PADEP.

PADEP noted that past investigations have shown TCE concentrations exceeding 500 ug/kg extend far below 12 feet below ground surface (bgs), but Environmental Standards stated that

CDP will not excavate below 12 feet bgs because that "extends well in to the saturated zone at the three AOCs" (Id.). PADEP does not raise any issues regarding contamination going below that level in their current comments on section 4.4 (Armstrong 2017, p 3). PADEP's only comment is to use a more sensitive photo-ionization detector than had been used previously and to base the limits of the excavation on laboratory analytical results (Id.). PADEP has apparently accepted CDP's intent to stop at the point where they encounter saturated conditions.

Environmental Standards claimed that "it is not CDP's intent to achieve Act 2 standards in saturated soil, which is clearly a groundwater issue" (Environmental Standards 2016, p 3). They claim that CDP has "satisfied its remedial obligations at the Site pursuant to a Consent Order" (Id.). They also claim that the current proposed excavation "goes far beyond the legal obligation" at the site (Id.). Environmental Standards also notes that "CDP has no obligation to remediate saturated soils and will not do so, aside from excavating saturated soils below the planned unsaturated soil excavations. The proposed removal ... is a voluntary act on the part of CDP ..." (Environmental Standards 2016a, p 6). CDP is clearly arguing that even this excavation is beyond their responsibility. This will allow TCE in groundwater at the site to continue as a source far into the future. PADEP does not counter this in any way (Armstrong 2017).

CDP's insistence on not excavating into saturated soil could leave more contamination in the ground if they excavate during a wet period. Tables and figures in Baker (2009) shows the groundwater elevation at various wells in the area varied by several feet over the years of sampling. The water level sampling did not necessarily coincide with wet periods nor were measurements made frequently enough to be assured of capturing high water tables. Excavation that occurs during wet periods could end up removing several feet less soil, and significantly less contamination, because of a high water table. PADEP should require remediation during dry periods to assure that more soils are unsaturated.

CDP also refuses to consider whether backfilling with certain materials, such as gravel, would "exacerbate migration of contaminants in groundwater or subsurface vapors" (Environmental Standards 2016, p 6) because they will install "vapor mitigation systems" (Id.) in nearby structures. Clean gravel will cause there to be a vapor pressure gradient established between the remaining contaminated soil and the clean gravel. The gradient could establish transport to the clean gravel and if the sources have sufficient TCE mass in them, they may no longer be clean. CDP considers it a nonissue (Id.) and PADEP is no longer concerned with this, as shown by their remaining comment that fill "must comply with DEP's Clean Fill Policy" (Armstrong 2017, p 4). Backfilling with gravel could cause precipitated TCE in the saturated soil to diffuse into the backfill such that the site could be as much of a source after excavation as before.

Conclusion

Chlorinated solvents contaminating soils and groundwater beneath the Bishop Tube Superfund Site have been a risk to human health and ecosystems in the Valley Creek watershed since at least the 1980s. Large quantities have bound to unsaturated soils at the site and have leached into groundwater. TCE is found more than 300 feet bgs in bedrock fractures because of its high density.

Characteristics of TCE and related products cause it to remain at the site and slowly dissolve into groundwater. Because the contaminants are toxic at extremely low concentrations, the unremediated site will continue to be a hazard for the foreseeable future. Contaminants can pass downstream through surface waters from LVC to Valley Creek and the Schuylkill River or through groundwater by transporting with groundwater flow through bedrock fractures to points of discharge, including springs or streams. It is likely that not all discharge points to surface waters have been identified. Contaminants also can pass offsite as dust.

The remediation plan implemented as part of developing this site would not protect downgradient or downstream resources from TCE contamination because it leaves too much TCE in place. Also, it would expose the existing contamination to wind and rain which would cause it to erode and pass downstream or downwind where it would contaminate additional areas. Also, much of the contamination would remain in place, especially in groundwater and soils outside of the targeted excavation zone. Other than the additional contamination caused by water and wind erosion, this residential development and remediation will expose substantial amounts of contamination that would be left in place to increased erosion. The development would not contribute substantially to the necessary remediation of downstream and downgradient resources.

PADEP's former comments had urged substantial improvement to the remediation plan, but their most recent comments simply accept the developer's plans and refusals regarding the full removal of TCE from the site. The site will continue to be a source of contamination to groundwater and nearby surface water even after it is developed for residential uses. The uncertainties around the current assessments of the extent of contamination at the site will remain but be underneath a residential development.

References

Armstrong DA (2017) Letter to Mr. Guy Wolfington, Constitution Drive Partners, L.P, Re: Bishop Tube Site, Remediation Scope of Work for Targeted Soil Excavation. PA Department of Environmental Protection, March 13, 2017.

Baker, Michael, Jr. (2009) Shallow Groundwater Feasibility Study Report, Bishop Tube Site, East Whiteland Township, Chester County, Pennsylvania, PADEP Contract No. SAP40000006380, Prepared for Pennsylvania Dept of Environmental Protection.

Environmental Standards, Inc. (2017) Remediation Scope of Work for Target Soil Excavation, Bishop Tube Facility, 1 Malin Road, Malvern Pennsylvania. Valley Forge PA. August 23, 2016, Revised January 16, 2017.

Environmental Standards (2016) Letter to Mr. Dustin A. Armstrong, Pennsylvania Department of Environmental Protection, Norristown PA, Response to Comments, Bishop Tube Site, Remedial Scope-of-Work for Targeted Soil Excavation. October 10, 2016.

Roux Associates (2015) Remedial Investigations Report, Former Bishop Tube Property, Chester County Pennsylvania. Prepared for the Bishop Tube Project Team. August 31, 2015, Logan Township, NY